Observations on Aquarium Specimens of *Oliva sayana* Ravenel

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(Plate 2)

INTRODUCTION

Oliva sayana is the common, large *Oliva* in Florida occurring along both coasts, and in some localities quite plentifully although like *Olivella nivea* Gmelin, 1791, fast disappearing in others. It is an excellent aquarium snail with interesting habits and will thrive for many years with minimum attention. Essential is a fairly large or spacious tank of sea water, provided with a deep sand layer, the water kept fresh and well aerated and on occasions changed when cleaning is required. Normally, the snail lies buried in the sand out of sight, the siphonal tube generally protruding above, straight as a stick, or swinging back and forth as if to keep track of what may be taking place above. At meal time, the snails will emerge obediently and accept a great variety of animal food, such as pieces of fish, shrimp, steak, and best of all, other live mollusks such as *Nassarius, Donax* and *Laevicardium*. Olives have long been known to be both scavengers as well as active predators on other mollusks but the actual manner of food capture remained imperfectly known. The following notes record some of our observations along this line made over a period of several years.

SNAIL WATCHING

In July 1967, our pastime of **Snail Watching** became even more exciting when several of our aquarium inmates began to produce egg capsules in a seemingly endless procession, a performance repeated at intervals for about three months. Although the egg capsules of *Olivella* and its veligers have been described in detail by Marcus in Brazil, those of *Oliva* itself remained unrecorded at far as we have been able to learn. We are offering a few illustrations based on photographs; those of the veligers are experimental and were taken under rather high power. Since a live veliger is a very active little creature, passing in and out of the limited field of view and at different levels, instantaneous exposures were taken and only partial focus secured.

FOOD HABITS

Several years ago the senior author observed *Agaronia* preying on *Olivella* on a beach near Manta, Ecuador. After capture of an *Olivella*, the body of the *Agaronia* would swell up into a rounded ball suggesting that the smaller animal had been directly swallowed. Gently squeezing the body of the *Agaronia*, the *Olivella* would pop out, and placed in a dish of sea water, would quickly recover. As these observations were made in the field, incidental to more pressing duties, it is possible that a mistaken interpretation had been made as suggested by Marcus (1959). That small mollusks, such as *Ervilia, Semelina, Caecum*, as well as ostracods and foraminifera, are habitually swallowed by several species of *Olivella* (*O. nivea* (Gmelin, 1791), *O. gracilis* (Broderip & Sowerby, 1829), etc.) is proved, since their shells are commonly found intact and empty in the digestive tract on dissection. Logically, *Oliva* should be able to do the same with even larger forms; but additional observations on this subject are required. Even if the food pieces are large, the following procedure is normal. If pieces of fish, shrimp, or steak be placed in the tank, the Olives soon become aware of them and will begin to emerge and start on a round of investigation. When the food morsel is discovered, it is quickly seized and pushed

back under the foot and infolded in its hinder section as if tucked away in a pocket, which swells up into a rounded ball, the food item hidden away so completely that no part of it is visible externally. The Olive then retreats below sand level, going down head-first. The same procedure is used with live mollusks, such as *Donax* and *Laevicardium*, to which latter *Oliva sayana* is especially partial. A *L. vitellinum* (Reeve, 1844), if placed in the tank, seems to become aware of a lurking danger and will flip about energetically, especially if pursued by an Olive. Large *Laevicardium*, nearly the size of the Olive, may be taken, infolded in the foot, and carried underground. Clams with a rough surface, such as *Chione cancellata* (Linnaeus, 1767), are consistently rejected.

EGG CAPSULES AND VELIGERS

On July 13, 1967, the junior author noticed that one large *Oliva* had emerged and seemed to be acting rather peculiarly, the lobes of its mantle loose and flabby. At the same time, the surface of the sand appeared as if covered with small, crystal-clear balls, which like miniature balloons swayed and shifted about with the least agitation of the tank water. These balls proved to be transparent egg capsules containing minute white eggs, the capsules varying in shape from nearly spherical to oblong and about 1.7 mm in greatest length and about 1.5 mm in diameter. Each capsule held from 20 to 50 eggs, the eggs at first quite clear, darkening to nearly black as incubation set in. The skin of the capsule is quite tough, flexible when touched with a sharp needle. A group of capsules set apart in a dish of sea water incubated in from 3 to 5 days, the hatched embryos developing rapidly into nearly full-sized veligers which could be seen spinning around within the crowded space of the capsule for a day or more. In about the seventh day, the capsule would puncture at one end, the exit generally so small that only a single veliger could escape at a time, the others pushing on behind. From one capsule closely watched, the average time for the exit of a veliger was one minute and the entire capsule of 38 embryos to empty required a little over half an hour. In several other capsules, the last few veligers, unable to find the tiny exit, perished within. Once out, the veligers were extremely active for about two days, the cilia on their vela vibrating vigorously in a continuous wave-like pattern, producing the visual impression of rapidly rotating blades. Observed from above, the veligers looked like small helicopters with rapidly spinning rotor blades, or like a man on a bicycle, the shell hanging below. Occasionally the velar lobes would fold inward, and the embryo would sink to the bottom, sometimes to rest, or the embryo would begin to spin around actively as if to test, or to bore into, the substrate, for further metamorphosis, then to rise again for another tour about. At first, the velar flaps were clear but as they grew a little larger 4 brown spots appeared. As noticed by Marcus (1959) for the veligers of *Olivella verreauxii* (Ducros, 1857), those of *Oliva sayana* Ravenel, 1834 subsisted entirely on the yolk sacs within; these at first were dark and became gradually lighter in color. None of our veligers were able to undergo further metamorphosis, the substrate evidently being unfavorable.

SUMMARY

The egg capsules of *Oliva sayana* are free, hence subject to dispersal by currents; they differ from those of *Olivella verreauxii*, which are attached (Marcus, 1959). Whether this distinction is generic remains for future research to determine.

Our observations show that many details of molluscan life may be obtained by patient snail watching of aquarium specimens. Species of *Oliva* lend themselves admirably for this purpose through their ready adaptability to aquarium life, and they possess many interesting habits.

LITERATURE CITED

Marcus, Ernst
1959. Studies on Olividae. Bol. Fac. Filos. Ciene. S. Paulo, Zool. 22: 99 - 188

Explanation of Plate 2

Figure 1: *Oliva* scouting and sensing shrimp.
Figure 2: *Oliva* going down with shrimp infolded in the foot.
Figure 3: *Oliva* held in hand showing sole of foot, the propodium down and the food package infolded in the hinder section of the foot.
Figure 4: Egg capsule, punctured and partly emptied. One veliger free outside, another part way out. ca. × 35.
Figures 5, 6: Free veligers. ca. × 160. Note small foot, shell, operculum, etc.